

**ABSTRACT OF THE DISCLOSURE**

A diamond composite heat spreader having a variable thermal conductivity gradient can improve control of heat transfer based on a specific application. A diamond-containing region of the heat spreader can contain diamond particles such that the diamond concentration and/or the diamond particle size is varied to produce a desired thermal conductivity gradient. Regions proximate to a heat source can have a higher thermal conductivity than regions further away from the heat source. Thin diamond films can also be used in conjunction with the particulate diamond in order to provide a region of maximum thermal conductivity adjacent a heat source. By providing a variable thermal conductivity gradient, more expensive materials such as diamond film and larger diamond particles can be selectively used in regions closer to a heat source, while allowing for cheaper smaller diamond particles and materials to be used farther away from the heat source where thermal conductivity can be lower without sacrificing overall performance.